TACTICAL MOBILITY AND THE IN-STRIDE OBSTACLE BREACH: IMPOSSIBLE, PROBABLE, FUTURISTIC?

A Monograph

by

Major James W. DeLony
Engineer

School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

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The study begins with a discussion of tactical mobility theory associated with an in-stride obstacle breach. Historical experiences and doctrine for breaching obstacles from World War II are presented for the U.S. and the Soviets. Current doctrine, equipment, and force structure for the two armies are reviewed for analysis and comparisons. Conclusions as to the strengths and weaknesses of each army's capability to conduct an
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By

Major James W. DeLony
Engineer

School of Advanced Military Studies
U.S. Army Command and General Staff College
Ft. Leavenworth, Kansas

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Approved by:

______________________ Monograph Director
Colonel Julian M. Campbell, Jr., M.S.

______________________ Director, School of Advanced Military Studies
Colonel L. D. Holder, MA

Philip J. Brookes
______________________ Director, Graduate Degree Programs
Philip J. Brookes, Ph.D.

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ABSTRACT

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by Major James W. DeLony, USA, 56 pages.

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The paper concludes that the current mobility capabilities of the U.S. Army do not support the AirLand Battle doctrine prescribing an in-stride obstacle breach. The Soviets possess an historical and experience based total force mobility capability that can achieve an in-stride obstacle breach to support their doctrine of engagements in depth. Improved equipment development and fielding, integration of engineer mobility and reconnaissance assets within maneuver forces, and better command and control of mobility assets are needed to produce the "essential factors" required to accomplish the complex task of an in-stride obstacle breach.

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SECTION I: INTRODUCTION

The purpose of this paper is to examine the concept of the in-stride obstacle breach by a tactical maneuver force. The battlefield environment is in direct contrast to this concept. Battlefield friction, due to the effects of terrain and obstacles, and the requirement for integrated, synchronized, and combined armed forces to affect a decisive military success, complicate both movement and maneuver. Recognition of this problem by Soviet and U.S. forces differs in doctrine, applied technology, and organization for combat. However, fundamental to both is the concept of a tactical formation with the capacity to maneuver through an obstacle, existing or reinforcing, without loss of momentum.

The in-stride breach is a complex operation. Despite its tactical significance in the current doctrines of both the U.S. and the Soviets, its feasibility for either army is open to question. Modern methods of terrain obstacle reinforcement, mobility limitations of combat vehicles, and the limitation imposed by the near equality in mobility and countermobility capabilities create the condition that the in-stride breach is quite deliberate. Only through a well conceived doctrine, application of the latest technology, and correct organization for combat can the momentum of offensive maneuver be sustained concurrent with the breaching of obstacles. This paper examines the current in-stride breach doctrine of the U.S. and Soviet Armies. World War II

experiences are presented to trace the evolutionary nature of Soviet doctrine, and to provide the relevant historical reference for current U.S. doctrine. The paper concludes with an analysis and comparison of the two doctrines, conclusions as to the current force mobility capabilities to execute an in-stride breach, and recommendations for future in-stride breach operations.

In order to define and therefore limit the scope of this paper, several assumptions are required:

1. The European Theater of Operations will be the focus [illegible] of the in-stride breach in a mid-to-high [illegible].

2. [illegible] current doctrine, equipment, and [illegible] are limited to "open" source literature and do [illegible] latest [illegible].

3. The U.S. Army doctrinal definition of the concept of [illegible] breach will be the doctrinal definition for [illegible] as per FM 90-13-1, Combined Arms [illegible] Operations: The In-Stride Breach, dated June [illegible], an in-stride breach [illegible] a counterobstacle operation [illegible] an obstacle with a minimum loss of [illegible]. The in-stride breach is distinguished from a [illegible] breach by both the relative amount of planning and preparation as well as the method of securing the far or enemy side of the obstacle.

SECTION II: TACTICAL MOBILITY AND THE IN-STRIDE BREACH

> Success in war depends upon mobility and mobility upon time. Mobility leads to mass, to surprise, and to security. Other things being equal, the most mobile side must win: this is a truism in war as in horse-racing. J.F.C. Fuller[1]

> Nothing is more difficult than the art of maneuver. What is difficult about maneuver is to make the devious route the most direct and to turn misfortune to advantage. Sun Tzu[2]

Tactical mobility is the ability of a maneuver force to move personnel and equipment on the battlefield without disruption or delay due to effects of terrain or obstacles. The environment of the battlefield, according to Clausewitz, makes "action in war like movement in a resistant element". Within the concept of tactical mobility is a demand for physical mobility to overcome the natural effects of terrain. Clausewitzian friction, described by theorist Richard Simpkin as primarily a physical phenomenon, certainly is an appropriate term to describe the battlefield relative to physical mobility. The terrain factors of surface configuration, surface materials, drainage, vegetation, and

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[1]Michael Carver, The Apostles of Mobility: The Theory and Practice of Armoured Warfare, Lees Knowles Lectures (London: Weidenfeld and Nicholson, 1979), p. 27.

[2] Sun Tzu, The Art of War (London: Oxford University Press, 1963), p. 102.

built-up areas, interactively coupled with weather, affect mobility operations by stopping, delaying, or constricting movement on the ground. Added to the friction caused by terrain and weather are enemy countermobility operations, which further deny physical freedom of movement by reinforcing the natural terrain with man-made obstacles and fires.[3]

Beyond the physical restraints of terrain, maneuver forces, using the capability of tactical mobility, must concurrently overcome the friction inherent to combined arms maneuver and generation of combat power. In his article concerning the development of combat power, COL Huba Wass de Czege states that in order to create a favorable effect on the enemy force, mobility or physical movement alone is not decisive, but rather is an "enabling capability".[4] Note that the opening quotation by J.F.C. Fuller agrees with the role of mobility as an enabling capability allowing for the application of the principles of war--specifically, mass, surprise, and security. I submit that the principles of economy of force, simplicity, and finally the obvious, offensive, are also dependent on the enabling capability of tactical mobility.

This concept of mobility as an enabling capability does not provide the elements or attributes essential for a

[3] Richard E. Simpkin, Race To The Swift (London: Brassey's Defence Publishers, 1985), p. 109.

[4] Huba Wass de Czege, "Understanding and Developing Combat Power," AMSP Course Two Readings (AY 88/89), p. 13.

maneuver force to achieve relative mobility due to the friction of terrain and enemy. Given the premise that tactical mobility is critical to the employment of combat power in support of the principles of war, just what does this mean for modern, mobile forces? Writing while a student at the Army War College, General Creighton Abrams, a highly successful tank battalion commander in World War II, stated that mobility is a complex balance of "essential factors"--equipment, organization, communications, command structure, and logistical organization. This holistic approach to tactical mobility as defined by General Abrams captures the nature of the requirements to execute an in-stride breach. Mobility constitutes a capability--the in-stride breach therefore is both a capability and a mission requiring specifically organized and equipped forces for execution.

The concept of the in-stride breach challenges the limits of a maneuver force's tactical mobility. The above quotation by J.F.C. Fuller recognizes the limiting and challenging nature of this particular tactical mission. The concept of an obstacle breach in-stride relates to the time, mass, and security aspects of both mobility operations and maneuver. Sun Tzu, though many years from modern, mobile warfare, does enlighten us on the idea of the "devious" route. Depending on the factors of mission, enemy, terrain, troops, and time available (METT-T), the "devious" route optimises the conditions for a successful in-stride mobility operation as the enemy's strength would be massed on the obvious route.

Time is an important aspect of in-stride mobility operations. Though a breach in-stride by its concept suggests rapid action, the time required to conduct an in-stride breach is normally greater than the time required to reduce the obstacle with mobility assets. In-stride operations also require detection of the obstacle, decision as to the best location for the breach, and effective suppression of enemy fires and observation of the breaching operation. This is accomplished by reconnaissance, integrated tactical battle drills, firepower, deception, and electronic countermeasures. Therefore, the time factor of in-stride breach operations relates to task execution by synchronized mobility and maneuver assets, i.e. "essential factors", to accomplish multiple operations and tasks, and not to the single task of creating a passage through an obstacle.

SECTION III: U.S. ARMY DOCTRINE AND THE IN-STRIDE BREACH

> The Germans believe that the modern trend toward motorization and mechanization demands a much larger proportion of Engineer and other troops with the combat troops than formerly. We seem to be moving in exactly the opposite direction.[5] MG J.L. Schley, Chief of Engineers, 1937-1941

World War II Breaching Operations

In the period immediately before the war and until 1942, mobility operations in support of maneuver units were influenced primarily by three developments: the success of German *Blitzkrieg* tactics, the experiences of the 1941 training maneuvers in the southern United States, and the increase of obstacles in the European theater.[6] In 1941 and 1942, the Engineer School conducted a series of tests to evaluate the current doctrine for breaching obstacles. Focusing on mobility support to armor and infantry units in breaching obstacles similar to those found on the Siegfried Line, the final report found that mobility operations required specially trained soldiers to assault and reduce obstacles, that infantry and engineers should both be trained in the use of demolitions, and that the infantry division organization was unsuitable for the conduct of breaching operations due to

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[5] Blanche D. Coll, Jean E. Keith and Herbert H. Rosenthal, *The Corps of Engineers: Troops and Equipment*, United States Army in World War II (Washington D.C.: Office of the Chief of Military History, 1958), p. 14.

[6] Marion Cain and Stanley Murphy, "Development of Engineer Tactical Doctrine and Equipment," *Engineer*, Winter 1985-86, p. 33.

the smallness of the divisional engineer battalion(520 men). The report also concluded that the current doctrine for the conduct of breaching operations was sound but needed clarification.[7]

FM 5-6, Engineer Field Manual--Operations of Engineer Field Units, dated April, 1943, and FM 100-5 Operations, dated 22 May 1941, prescribed five specific assault techniques to breach obstacles: hand-placed charges, hand removal, artillery fire, bridging, and direct fire from tanks or tank destroyers. Minefields were to be breached by manual removal using probes, placement of explosives near the mine, or removal and disarming by hand. Assault of enemy obstacles was to be conducted in four phases as a combined arms operation of infantry, artillery, engineers, tanks, and chemical smoke units. Phase I, reduction of the enemy outpost system, was conducted by the artillery and infantry. Phase II consisted of a shift of artillery fires to enemy counterbattery and reserves while direct fire from tanks and tank destroyers suppressed enemy fire to protect the approaching assault and breaching detachments. Once at the obstacle, the breaching detachment would breach a gap through the obstacle, using hand-placed charges and manual mineclearing procedures. During Phase III, the assault detachment would pass through the gap to secure the far side with grenades, antitank rockets, flamethrowers, and handplaced charges. In Phase IV, mobile forces would pass through the gap and continue the

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attack. Neither manual mentioned the breaching of obstacles with mechanical means or prescribed a need to protect the breaching detachment ex through the use of smoke and enemy fire suppression by art y and covering fires. Furthermore, there was n ention of a requirement to conduct an in-stride breach of an bstacie to sustain the momentum of the maneuver or attack.[9]

By 1943, the accumu ed experiences of the Soviets, British, and the North can and Italian campaigns began to affect U.S. training an bility equipment development. The extensive use of minefields and wire obstacles by the Germans resulted in a requirement that select officers of every combat unit, prior to deployment overseas, would receive a one week course on the laying of hasty minefields and the breaching of German minefields.[10]

The effect of minefields on mobility also cau ed significant research for development of explosive and mechanical breaching devices to reduce danger and time. Explosive line charges, such as the British bangalore torpedo and the Canadian snake, were adopted for explosive reduction of minefields. Mechanical breaching equipment development,

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[8]Field Manual 100-5, Operations (22 May 1941), p. 183.

[9]Field Manual 5-6, Operations of Engineer Units (23 April 1943), pp. 72-84.

[10]Marion Cain and Stanley Murphy, "Development of Engineer Tactical Doctrine and Equipment," Engineer, Winter 1985-86, p. 33.

begun in 1942 with thought of a method which offered the advantages of less time and manpower to clear mines, had very limited success. Except for armor protected D-7 dozers and the mounting of a blade on a very small number of medium tanks, all the items "developed were either too heavy, too complicated to project into a minefield, too slow, or too lacking in dependability."[11] Pressure for a detection device for mines, particularly a vehicular mounted device, met with similar results. Research methods failed to develop a dependable and effective mine detector prior to the end of the war. The only available detector, the SCR 625, was unreliable and only detected metallic mines, rendering it useless in areas littered with artillery shrapnel. In light of these failed attempts in research and development, and the paucity of equipment fielding except for the snake and bangalore, "most mines were discovered and removed by soldiers, crawling on hands and knees and equipped only with probes, and the tank dozer remained the combat engineers' closest approach to an assault vehicle."[12]

Review of combat operations reveals the extensive manual clearing of mines and hand placement of explosive demolitions to reduce obstacles as prescribed by the doctrine. Casualties, loss of time and momentum, and heavy reliance on

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[11]Blanche D. Coll, Jean E. Keith, and Herbert H. Rosenthal, The Corps of Engineers: Troops and Equipment, United States Army in World War II (Washington D.C.: Office of the Chief of Military History, 1958), p. 476.

[12]Ibid., p. 480.

both the infantry and the engineer to conduct manual counterobstacle/countermine reduction operations were common to all phases of the war. Innovation was often demonstrated in mobility operations, such as the welding of a steel rod to the front of a tank to cut the hedgerows in the 'bocage' terrain of Normandy. The VIII Corps was able to sustain the Normandy breakout operation in July, 1944, because the infantry and armor soldiers of the lead divisions had been trained on manual clearing of mines, despite the retreating Germans leaving behind "the most extensive minefields encountered on the Continent."[13] Fortunately, the mine and reinforcing obstacle threat diminished significantly as the U.S. maneuver forces moved faster than German countermobility capabilities in the pursuit across France. However, at the Siegfried Line and West Wall, mobile operations were restricted by the countermobility operations of the defending Germans. Tactical operations in Lorraine, the Stolberg Corridor, and the Roer River Plain were hampered by a dependence on manual reduction of obstacles.[14]

Current U.S. Doctrine and the In-Stride Breach

AirLand Battle doctrine is the U.S. Army's approach to

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[13]Alfred M. Beck, et.al., The Corps of Engineers: The War Against Germany, United States Army in World War II (Washington D.C.: U.S. Government Printing Office, 1985), p. 380.

[14]Russel H. Stolfi, Mine and Countermine Warfare in Recent History, 1914-1970 Report No. 1582 (Aberdeen Proving Ground, Md.: Ballistic Research Laboratories, 1972), pp. 80-88.

generating and applying combat power. The concept of securing and retaining initiative through the delivery of a powerful blow from an unexpected direction and followed by aggressive, continuous operations to accomplish the mission requires that mobility relative to the terrain and the enemy must be maintained. FC 90-13, Counterobstacle and Rivercrossing Operations, defines mobility as the ability to move quickly and decisively in any direction without loss of momentum. Recognizing that obstacles are the most serious threat to maintenance of mobility, the doctrine correctly prescribes that U.S. forces must be able to overcome a wide variety of natural and reinforcing obstacles through a coordinated, combined arms operation. However, the doctrine states that a counterobstacle operation is not "a mission in itself."[15]

This coordinated, combined arms operation, termed the mobility scheme, requires maneuver forces to be able to conduct counterobstacle operations in accordance with four interdependent tenets: initiative, agility, depth, and synchronization. The mobility scheme, structured to execute a series of operations which will overcome obstacles to movement and maneuver, is systematic in its approach, but requires integration of two organizational elements to achieve effect. Figure 1 is an extract from FC 90-13 and FM 5-101, Mobility, which graphically depicts the interaction of the two organizational components, the lead and follow-on forces, in

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[15]Field Circular 90-13, Counterobstacle and River Crossing Operations (March 1987), pp. 2-7 to 2-18.

breaching an obstacle. Based on a METT-T assessment, the commander may decide that the counterobstacle operation must be executed in-stride to maintain the momentum. This in-stride breach of the obstacle, doctrinally executed at battalion task force and/or company team level, is considered to be a preplanned and drilled operation rather than an operation which requires extensive planning and massing of combat forces.

The doctrine of the in-stride breach is conceptually tied to the "battle drill"--a rehearsed and standardized operation which the force executes as an immediate reaction to an obstacle. Based on the the earlier World War II doctrine of assaulting an obstacle in four phases, the in-stride breach battle drill involves the organizing of the maneuver task force into three elements: the support force, the breaching force, and the assault force. These three elements execute the in-stride breach by accomplishing four tasks:

> SUPPRESS: Suppression is the prevention of enemy fires from attacking the force executing the reduction of the obstacle.
>
> OBSCURE: Obscuration prevents direct observation of the obstacle crossing sites(s).
>
> SECURE: Securing the crossing site prevents enemy ground forces from attacking the force during breaching operations. Security of the far side of the obstacle is done by direct or indirect fire rather than physical occupation to facilitate speed and economy of force.
>
> REDUCE: Reduction is the physical creation of lanes or gaps in through or over the obstacle. The doctrine requires that two lanes be prepared for a

maneuver task force.

The in-stride breach doctrine has been developed into several counterobstacle battle drills which prescribe guidelines for the organization of weapons and combined arms assets, such as engineers, which are required to conduct the operation. Figure 2 is an extract from FC 90-13-1, Combined Arms Counterobstacle Operations: The In-Stride Breach, which provides an example of a mechanized task for in the conduct of an in-stride breach operation. The reduction element in this example is to use both mechanical and explosive means to create lanes through the obstacle. Artillery, overwatching indirect and direct fires, reconnaissance elements, smoke, and command and control to synchronize the operation, though considered a rehearsed drill, are complex.

Organization and Equipment to Conduct the In-Stride Breach

The combined arms nature of in-stride breach operations as required by the doctrine places great emphasis on the equipment and organizations to conduct the operation. Execution of the in-stride breach is a battalion task force operation as this is the lowest echelon at which the elements of firepower, maneuver, intelligence, and support are combined under a single commander. According to FM 71-2, The Tank and Mechanized Infantry Task Force, the allocation of engineer support for a battalion task force is normally an engineer platoon depending on METT-T. Figure 2 is a U.S. battalion task force organized for an in-stride breach operation with an engineer company in direct support. Note the reconnaissance

element is the battalion task force organic scouts and does not include engineers. The specific equipment available for the reduction of the obstacle to create a lane is the combat engineer vehicle, the armored combat earthmover, a towed trailer with the mine-clearing line charge, and demolition explosives carried on the engineer squad tracks, such as the bangalore torpedo and composition C-4 explosive blocks. The maneuver task force has organic direct and indirect firepower firepower, as well as the indirect fires of direct support artillery.

SECTION IV: SOVIET ARMY DOCTRINE AND THE IN-STRIDE BREACH

> The tactical art of our troop units is developed around a lofty moral and political core, and is based on mobility, boldness, and constant pressure.
> Mikhail N. Tukhachevskiy[16]

Soviet World War II Breaching Operations

Soviet Doctrine in the years preceding and during World War II concentrated on the theory of the engagement in depth. As technical and material resources were developed to execute this doctrine, the organization of the Soviet Army was adapted to accommodate the simultaneous employment of mass weaponry throughout the depth of the enemy defensive zone with the aim of encirclement and annihilation. Success depended on surprise, a "skillful combination of movement", coordination of fires, and maneuver involving close and continuous cooperation between the combat and service support arms.[17] During the war, tactical combat experience was continually studied on the theoretical level for improving weapons and tactics. In particular, the need for integration of combat engineer support of mobility operations to sustain the rapid pace of the offense was recognized throughout the war.

In the first period of the war, combat engineer support

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[16] Art of War Collquium Publication--New Problems in Warfare by M. Tukhachevskiy (Carlisle Barracks, Pa.: U.S. Army War College, 1983), p. 65.

[17] V. G. Reznichenko, ed., Tactics--A Soviet View, Soviet Military Thought (Washington D.C.: U.S. Government Printing Office, 1987), p. 7-8.

was largely concerned with supplying engineer weapons, training the infantry, and construction. Suffering great losses due to poor tactical control of engineer assets in the early years of the war, the Soviet Army reorganized the division engineer battalion in 1941, reducing its strength from 805 men to 162 men. This reduction of engineers at the division level allowed for the creation of independent engineer companies, battalions, regiments, and brigades controlled by higher headquarters. This centralization of men and equipment allowed for concentration of the mobility assets behind the main effort. Included in this reorganization were "assault engineer-sapper" battalions of approximately 290 men. Other special unit were mining companies, road construction battalions, and bridge companies. These units were often mission organized into assault engineer brigades of varying sizes.[10]

Soviet doctrine required that a rifle battalion be supported by a platoon of engineers; each regiment by a company, and a division by a battalion. This required at least a battalion of combat engineers beyond the organic divisional engineers. This requirement was met by attaching assault engineer battalions of the corps or armies, but only when the division was conducting a breakthrough of a fortified zone or an assault in a built-up area. This insured

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[10]Edward N. Luttwak, The Soviet Army of the Second World War-Assault Engineer-Sapper Brigades Histotical Analysis and Projection for Army 2000 (Chevy Chase, Md.: 1983), pp. 1-4.

concentration of engineer assets in the zones where they would achieve the greatest effect relative to the main effort.[19]

This centralization of engineer assets afforded a concentrated engineer force to breach enemy obstacles necessary in the breakthrough operations of the second and third periods of the war(1943-1945). One critical aspect of Soviet breaching operations was engineer reconnaissance of the enemy defense prior to the start of offensive operations. Extensive use of engineer reconnaissance posts provided critical information concerning the location and density of obstacles, and allowed for detailed mission analysis of engineer forces required to conduct breaching operations. These engineer reconnaissance posts also included in depth reconnaissance of the enemy defense behind the initial line of defense. This facilitated planning of mobility assets required in the movement to the enemy tactical depths by second and third echelon forces.

Until 1942, breaching techniques exclusively involved hand clearing of mines and reduction of other obstacles by manual labor. Beginning in 1943, explosive and mechanical clearing techniques were adapted to counter the extensive German use of minefields and obstacles to slow the Soviet advance. In the Kiev operation in 1943, the use of the PT-3 mine roller mounted on a tank was used to lead the assault for the First Ukranian Front in the Vistula-Oder Operation. Eventually, engineer tank regiments were formed to support

[19]Ibid., p. [illegible].

countermine operations. Each tank regiment, organized into three companies, had 20 PT-3's. Deployed in pairs to clear a 4.8 meter lane, these mine rollers were used with engineer troops as escorts to mark the cleared lanes. Explosive breaching techniques included development of a line charge, the UZ, that eventually was refined to create a six meter wide lane. Despite these improvements in technical equipment, significant numbers of engineer sapper units were still required to support the first echelon maneuver forces in the offense. During the offensive operations of 1944-45, 10 or more sapper companies were used per kilometer of front in the breakthrough sector. Specific examples include 7 companies per kilometer at Kursk and 13-17 in East Prussia. In the special cases of attacks on cities, the density reached 17-22 companies per kilometer of front.[20]

Soviet in-stride breach operations of minefields were fairly refined by the end of the war. By experience, breaching operations in support of a mobile operation required "massed" use of tank mounted PT-3 mine rollers, artillery, and infantry. A company of mine-clearing tanks with a sapper platoon would clear minefield passages for a tank regiment. As the assault phase of the breach begin, the mine clearing tanks would move forward in pairs along predesignated routes and clear a 4.8 meter strip. The mine clearing tanks would

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[20]Yegevgeniy Kolibernov, Vasily Kornev, and Andrey Soskov, Combat Engineer Support, Foreign Broadcast Information Service--USSR Report (Washington D.C.: Foreign Broadcast Information Service, 1985), p. 16.

follow each other in echelon at a distance of 15 to 25 meters. Lanes for the infantry(1.2 meters) were made by a single mine clearing tank that could be widened by sappers using explosive line charges. Infantry lanes could also be created by line charges "pushed" into the minefield by a tank, but this was slow due to assembly time for the line charges.[21]

One other tactic developed by the end of the war was the formation of small groups of sappers to follow the lead reconnaissance element in a tactical march and clear obstacles in the advance of the main body. These sappers, using explosives, motorized graders, and special route clearing bulldozers, created fords, developed bypasses, and cleared the route of destroyed vehicles and other battlefield damage. By trailing this advance element, the main body of the maneuver force could pass through an obstacle or an area of restricted mobility without loss of time or momentum.[22]

Current Soviet In-Stride Breach Operations

Current Soviet doctrine stresses that the offense is the most decisive form of combat. Building on the theoretical and practical experiences of World War II, the theory of engagement in depth has been refined into modern tactics to employ the very latest in modern technology in combined arms

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[21] A. Soskov, "Wartime Operations: Methods of Breaching Minefields," Voyenno-Istoricheskiy Zhurnak, 24 March 1980, p. 16.

[22] Yegevgeniy Kolibernov, Vasily Kornev, and Andrey Soskov, Combat Engineer Support, Foreign Broadcast Information Service--USSR Report (Washington D.C.: Foreign Broadcast Information Service, 1985), p. 17.

combat operations. Fundamental to success of Soviet offensive operations are high rates of advance by maneuver forces that disrupt and destroy the integrity of the enemy's forces. Soviet principles of war at the tactical and operational level are listed below:[23] [24] [25]

1. The achievement of battlefield mobility and rapid tempo of attack.
2. The achievement of an adequate correlation of forces at the decisive place and time.
3. Surprise.
4. Continuous operations.
5. Preservation of combat power by maintenance of combat ready forces, command and control, and good morale of the soldiers.
6. Co-operation of all arms and services.
7. Not attempting too little or too much with the forces available.
8. Carry the battle to the depths of the enemy deployment and deep in his rear.

The Soviets identify three types of combat operations: the meeting engagement, the offense, and the defense. The meeting engagement, a form of the offense, is recognized separately to emphasize its importance. The offense is further divided into the attack, the exploitation, and the pursuit culminating in the encirclement. Each of these offensive operations is to be conducted by the maximum use of maneuver, firepower, and shock action. The meeting engagement and the

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[23] C.N. Donnelly, "Engineers of the Soviet Army," International Defense Review (February 1978), p. 195.

[24] Richard Simpkin, Red Armour (Elmsford, N.Y.: Brassey's International Defense, 1984), p. 22.

[25] V. G. Reznichenko, ed., Tactics--A Soviet View, Soviet Military Thought (Washington D.C.: U.S. Government Printing Office, 1987), pp. 41-58.

offense are predicated on the maintenance of the initiative, freedom of movement and maneuver, combat on a wide front, rapid troop deployment and concentration, and the ability to generate high rates of advance against the enemy, thus resulting in both his destruction and dislocation. The doctrine is highly dependent on achieving superior mobility relative to the enemy to sustain the momentum of the operation.

The role of mobility operations to achieve the "combat mission" assigned the tactical commander is well recognized in the tactics, force structure, and training of Soviet forces. Soviet combat missions relate to the defeat of the enemy force, the nature of the terrain, and time. This relationship of enemy, terrain, and time cause deliberate structuring of maneuver forces for in-stride counterobstacle operations to sustain momentum and tempo. The battle formation as well as the force structure of the combat units corresponds to the concept of sustaining high mobility and movement rates to achieve engagement in depth of the enemy force. Notably, Soviet doctrine requires the designation of successive echelons to breakthrough enemy defenses and exploit the success achieved by a rapid, decisive, and integrated operation. The use of set formations of combined arms forces with reconnaissance, advance guards, and main body elements allow for flexible but concentrated movement. Engineer support for each of these elements is provided to overcome the natural and reinforcing obstacles encountered as the force maneuvers

on one of several routes.

The Soviet motorized rifle regiment in march formation is organized as shown in Figure 3. Note the dispersion of engineer elements throughout the formation to identify bypasses, reduce obstacles, and mark routes for the main force. The mission of the engineer reconnaissance patrol is to conduct engineer reconnaissance of the march route. In particular, the reconnaissance patrol is to locate enemy obstacles and determine either bypass options or estimates of engineer effort to reduce the obstacle. The movement support detachment(MSD), found in the forward security element or the advance guard, consists of engineer equipment assets from the division or regimental engineer company with attached infantry and armor for protection. The MSD conducts route clearing and preparation based on the estimates from the engineer reconnaiss.nce patrol. Figure 4 illustrates the organization and equipment of the engineer reconnaissance patrol and the MSD.

At the motorized rifle/tank battalion level, mobility assets consist of organic mine rollers and plows mounted on the tanks of the unit. When task organized with combat engineers from either regimental or divisional assets. engineer mobility assets are distributed much like those found in the regimental march formation. There is an engineer squad with the combat reconnaissance patrol, an MSD of at least a platoon with mine clearing equipment and blade assets, and the remainder of the engineer company moving in the forward

portion of the main body.

Much emphasis is placed on engineer reconnaissance, which can be performed independently or as a part of the maneuver force reconnaissance elements. By having the advance engineer reconnaissance patrol locate and estimate route bypasses or the effort required to create passages through the obstacle, a maneuver element can sustain its momentum. Due to the centralization of engineer assets above division, higher level commanders can weight the main effort with engineer equipment and sappers based on the results of the engineer reconnaissance estimates in the preparation phase of the attack.

When an obstacle is encountered that must be breached, powerful artillery fires are placed in the vicinity of the passage sites to neutralize and destroy overwatching enemy artillery, mortars, antitank missile, and small arms fires. Tanks and antitank missiles are deployed to provide direct fire. Smoke is used to obscure the enemy vision of the breaching operation. Organic tank mounted mine rollers and plows, and the attached engineers, are deployed forward to create the passages required for the maneuver force. Normally, one passage is created for each tank or motorized rifle company in the first echelon. Mechanical rollers and explosive line charges are used to breach lanes in minefields. Engineer dozers and multi-purpose counterobstacle vehicles(IMR combat engineer tractor) fill holes and remove debris. Dismounted sappers mark lanes and guide follow-on elements

through the passages.

During the clearing of the route of obstacles by the maneuver force direct support engineers, other engineer elements are constructing flank and rear obstacles of mines and point demolition obstacles for protection. This engineer element, the mobile obstacle detachment, though not directly involved in the reduction of obstacles blocking the advance, significantly contributes to the mobility of the advancing element by providing flank security, and the construction of reinforcing obstacles that will disrupt and delay enemy counterattack forces. Normally a platoon or company of sappers, the mobile obstacle detachment is often deployed with antitank reserve elements. Figure 5 is an example of the composition of a mobile obstacle detachment.[26]

Organization and Equipment to Conduct the In-Stride Breach

The need to rapidly overcome obstacles to achieve rapid penetration in depth of the enemy defenses has resulted in a general concept that maneuver tank and infantry forces must have continuous mobility support throughout the operation. Engineer mobility assets, from organic and higher levels, are employed "to create the necessary conditions for the obstacle free movement of a unit and ensure its timely arrival at its objective or its successful entry into battle."[27] Critical to the success of the maneuver force's relative mobility is the

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[26] C.N. Donnelly, "Engineers of the Soviet Army," International Defense Review (February 1978), p. 200.

[27] Ibid., pp. 195-196.

centralized control of engineer-sappers and equipment. Figure 6 is a schematic of the regimental and divisional engineer organizations.

The essential features of Soviet engineer mobility forces are the ability of Soviet commanders to position their assets throughout the advancing maneuver forces to support the main effort at the point of the assault by direct support engineer-sappers; the placement of engineer reconnaissance forward to detect obstacles and develop bypass routes/estimates for reduction effort; finally, the utilization of engineer MSD's to sustain the mobility of the main body in the march. In the context of supporting mobility operations by providing security to the maneuver force, mobile obstacle detachments assist in preserving the momentum and security of the maneuver force by the construction of reinforcing obstacles along the flanks of the movement route.

SECTION V: ANALYSIS AND EVALUATION

The concept of an in-stride breach is found in both the U.S and Soviet armies. Both require a mobility capability to overcome obstacles that sustains the momentum and tactical integrity of the movement/maneuver. However, the two armies differ in their historical experiences and perspectives, current doctrine, and organization for combat in designing the "essential factors" of a combined arms force with the capability to execute a breach of an obstacle "in-stride".

Historical Experiences and Perspectives

The two armies began World War II with a doctrine based on the hand-clearing of obstacles. The Soviets, in response to heavy losses and the extensive use of minefields on the Eastern front, were forced early in the war to develop alternatives. Detailed and continuous analysis of operations allowed for a steady improvement in technical equipment and maneuver force organization to execute obstacle breaching operations, a trend that continues until today. The U.S., a relative late-comer to the European theater, was also forced to explore alternatives to manual breaching techniques. Centralization of engineer mobility assets and the employment of large numbers of mine rollers and plows was not accomplished by the U.S. Certainly the ability of U.S. forces to move faster than the withdrawing Germans' ability to emplace mines and other obstacles accounts for some of the

historical perspectives of the two armies. For example, the U.S. did not develop an equivalent concept to the Soviet's movement support detachment or the mobile obstacle detachment. Following the war, the U.S., unlike the Soviets, did not maintain a balance between doctrine and the development and procurement of mobility equipment. Today, the mobility capabilities of the U.S., particularly in countermine warfare, are essentially the same as at the end of World War II.[28]

Current Doctrine and Organization for Combat

The current doctrine of the two armies requires combat engineers to clear obstacles in-stride to preserve the momentum of the maneuver force. The main battle tanks and infantry fighting vehicles of both armies have been designed to strike deep and rapidly with effective firepower. The responsibility for conduct of an in-stride breach is a maneuver commander's responsibility in both doctrines; however, the resultant tactics, equipment densities, and use of combat engineers are not similar. Figure 7 is a comparison of the organic breaching capabilities of U.S. and Soviet divisions. Note the higher density of engineer mobility assets in the Soviet division.

Richard Simpkin views the differences between the application of Soviet and U.S. mobility doctrines as "the Russian fights between moves and the Anglo-Saxon moves between

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[28] "U.S. Army General Officer Steering Committee Countermine Master Plan," U.S. Army Engineer School (14 September 1988), p. ES-5.

fights."[29] He also points out that significantly every Soviet offensive tactical diagram he has studied began with the forces in column and ended with the forces reforming into column. This focus on constant movement to achieve "engagement in depth" places a higher priority on force structure and organization for combat for greater relative mobility than that found in the current U.S. doctrine. Though the tenets of the AirLand Battle doctrine are highly dependent on battlefield ground mobility, the translation of that requirement has not resulted in the development and fielding of large numbers of mobility systems to sustain in-stride breach operations.

Several U.S. doctrinal solutions require the use of mobility systems which are not compatible with the concept of an in-stride breach. For example, the number of mine plows/rollers are insufficient to counter the effects of a Soviet scatterable minefield. The doctrinal procedure found in FC 90-13-1 depicts an engineer company in direct support of a maneuver task force. With only four engineer companies [illegible] division, it is questionable that sufficient engineer forces would be available to provide a company per task force [illegible] augmentation from Corps assets. Non-divisional engineer [illegible] not compatibly equipped [illegible] mobility [illegible] forces.

[illegible]

[illegible]

of an obstacle are highly dependent on advance reconnaissance and planning by both maneuver and engineer forces. By placing engineer assets in the reconnaissance element of the maneuver force, planning and allocation of Soviet engineer mobility equipment is accomplished more rapidly and efficiently. The large number of mine plows available to armor heavy task forces allows for rapid reduction of minefields. The Soviets have a large concentration of combat engineer reserves above the division level that can be quickly integrated to support the forward maneuver forces as a MSD or mobile obstacle detachment. This is due to a deliberate structuring of non-divisional engineer assets much like their divisional counterparts and the Soviet World War II experience which verified the requirement for a large number of engineer-sappers forward to sustain the momentum of the main effort.[30]

Command and control of engineer elements to support the in-stride breach of an obstacle system are critical. The Soviet placement of an engineer commander at every level facilitates command and control ensures priority of engineer support to the main effort, and results in the rapid integration of additional engineer resources to support the total force (i.e. movement support detachments). The U.S. engineer command and control structure is not integrated with the maneuver forces. Relying on an archaic command and

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[30] Joseph Schroedel, "Tactical Mobility: Organizing Engineers for an All Arms Problem," School of Advanced Military Studies Monograph (1987), p. 33.

control structure, the effect is a thinly dispersed and uncoordinated engineer force that can not be focused on mobility support for the forward maneuver forces due to incompatible equipment and training.[31]

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[31]"U.S. Army General Officer Steering Committee Countermine Master Plan," U.S. Army Engineer School (14 September 1988), pp. 5-6.

SECTION VI: CONCLUSIONS

The concept of the in-stride obstacle breach on the modern battlefield is a critical component of the doctrines of the Soviet and the U.S armies. Given the difficulty and complexity of breaching an obstacle in-stride without affecting the momentum of the attack, the Soviets currently are better organized and equipped to perform this task. Superiority in both numbers and types of breaching equipment, organization and command and control of engineer mobility assets, and the integration of engineer and maneuver force reconnaissance enable the Soviets to effectively execute an instride obstacle breach. Remarkably, the two doctrines are very similar in their prescription of "how" to apply combat power to overcome an obstacle in-stride. However, the U.S. has failed to balance doctrinal "requirements" to fielded force "capabilities". The realities of combat development and equipment fielding and the integration of mobility engineer assets with maneuver forces have not kept pace with the evolution and demands of AirLand battle doctrine.

The current Soviet doctrine and organization for combat is largely shaped by the experiences of World War II. Detailed analysis of the mobile operations, particularly in the final two years of the war, continue today. Additionally, the Soviets are currently reevaluating their doctrinal rates of advance due to their experiences in Afghanistan. Though not widely reported in "open sources", the combined effects of

terrain and Afghani rebel mines has caused some doubt as to their ability to sustain the desired momentum of movement and maneuver. In particular, engineer requirements to support both main battle and rear area operations may have been underestimated.[32] Beyond reevaluation of their mobility doctrine, the Soviets continue to improve their engineer mobility equipment in both capabilities and survivability. The classification of this paper precludes a detailed discussion of these improvements or specific indications of Soviet research efforts particularly in the area of mine and countermine technology. Unquestionably the use of aerial platforms for reconnaissance and delivery of mobility equipment in the advance of ground maneuver forces as observed in Afghanistan is representative of the Soviet intention to continue improvement of their capability to sustain the momentum of ground maneuver forces.

This experienced-based commitment to improve mobility capability for overcoming obstacles in-stride is not evident in the current U.S. Army force structure. The problem has become so apparent that the House and Senate Armed Services Committees have expressed concern.[33] The failure to learn from the experiences of World War II and Vietnam have insured the failure of the U.S. army to conduct the in-stride obstacle on

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[32]Graham H. Turbiville, "Soviet Combat Engineers in Afghanistan," The Military Engineer, Sept/Oct 1987, p. 565.

[33]"U.S. Army General Officer Steering Committee Countermine Master Plan." U.S. Army Engineer School (14 September 1988), Preface.

the AirLand battlefield. In a recent National Training Center Lessons Learned Newsletter, the need for integrated and improved capabilities of detection and engineer reconnaissance of obstacles was stressed as well as a Soviet style emphasis on the importance of combat formations with integrated engineer support.[34] However, the actual reduction of the obstacles, particularly mines, depended on employment of limited engineer assets with only manually emplaced explosives or hand removal. By no means does the current U.S. mobility capabilities available to a maneuver force commander allow for an in-stride breach of an obstacle.

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[34] "NTC Leasons Learned," Combined Arms Training Activity (27 May 1988), p. 1-20.

SECTION VII: RECOMMENDATIONS

> To reveal the direction in which the cognitive process will develop further, it is necessary to detect in it the remnants of the past, fundamentals of the present, and the embryos of the future.
> General of the Army I. Shavrov[35]

The concept of the in-stride breach of an obstacle will remain an important task for the future AirLand Battle(ALB). U. S. tactical doctrine and force structure must be evaluated to insure maneuver force mobility capabilities meet the requirements of ALB doctrine. Not enough has been accomplished in the fielding of mobility equipment, integrating engineers with maneuver reconnaissance elements, and centralizing command and control of mobility assets. A review of the current forward-looking studies done by the U.S. Army Engineer School and the Training and Doctrine Command reveals that the problem of tactical mobility, in particular the capacity to conduct the in-stride obstacle breach, is very much a priority concern for future operations. The management of the combat development and fielding of critically needed mobility systems, and development of tactical procedures to enhance the maneuver force mobility can not repeat the poor performance of the years since World War II.

This paper has provided the current Soviet in-stride breach doctrine and capabilities. Current Soviet "open

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[35] Soviet Engineer Equipment: The Third Generation, U.S. Army Scientific and Technical Intelligence Bulletin (Washington, D.C.: U.S. Government Printing Office, May 1984), p. 97.

source" literature indicates that tactical mobility of ground maneuver forces continues to be a high priority. Certainly, it must be acknowledged that the current Soviet capabilities will continue to improve as modernization with new technology becomes feasible. The Soviets have fielded over 40 new equipment systems in their engineer force structure since 1970.[36] This trend is likely to continue, given the Soviets' sophisticated understanding of the importance of tactical mobility, in particular the capability to breach obstacles in-stride to sustain momentum and achieve a greater relative mobility. What appears to be most significant is the Soviet capability to field new systems and modify them to employ the latest technology. Having an historical and experienced-based requirements system, the Soviets have continued to gain experience in tactical in-stride breach operations while the U.S has continued to write doctrine and tactical procedures for equipment and capabilities which have not been available for training and evaluation.

Historical evidence supports the fact that as the battlefield becomes more lethal and artificially structured the role of engineers in tactical mobility operations increases. Historically, the requirements for total force mobility support have been underestimated prior to the start of the war, causing diversion of engineer assets from support of the forward combat units to the maintenance of the lines of

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[36]"Engineer Equipment Review," U.S. Army Engineer School, 16 December 1985.

communication.[37] Given the nature of ALB mobility requirements, forward maneuver forces must have full time, dedicated engineer support. This competition for engineer support, which exists even for peacetime training and construction priorities, causes a critical problem for peacetime force structure decisions. Design of engineer units to support maneuver forces can no longer be based on providing "general purpose" units. The need to integrate divisional and higher level engineer forces to support forward mobile operations can not be met unless the units have compatible equipment and training. The proposal to combine the assets of the divisional battalion and a Corps combat engineer battalion into one organic divisional engineer organization(E-Force) goes far in solving the command and control problems found at divisional level. Engineer support will be more agile and sustainable, resulting in better training, enhanced maneuver and engineer battle drill and doctrine development, and a command and control headquarters at the division level to integrate total force mobility support without degrading support to forward maneuver forces. This proposal should be implemented immediately. Once E-Force is in-place, the employment of U.S. mobile obstacle detachments and mobile support detachments should be explored to support division and brigade operations. These Soviet concepts have significant utility for mobility support at both the tactical and

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[37]John W. Morris, "Combat Engineers, Mobility, History, AirLand Battle," U.S. Army War College (23 March 1987), pp. 22-23.

operational maneuver levels.

Technology is changing the battlefield and the nature of combat at a pace not previously experienced. A noted Soviet expert remarked recently in a lecture at the School of Advanced Military Studies that operational and tactical mobility have not "kept up" with the means to deny movement on the modern battlefield. Manual means of detection and hand removal of mines and other obstacles must be eliminated for two reasons. First, the lethality of modern mines, particularly scatterable mines, make them too dangerous to clear by hand. Secondly, the time available to manually clear an obstacle has never been so short due the lethality of Soviet artillery and air assets. Clearing and reduction of obstacles must be either explosive or mechanical, therefore limiting soldier and equipment exposure to enemy fires. Stand-off explosive reduction means, such as fuel-air explosives, have considerable advantages as a "first priority" near-term solution. Mine rollers and plows for the M1 must be fielded immediately. The limitations of the current technology available for mechanical clearing of mines is acceptable if explosive line charges or fuel-air explosives can be used in conjunction with mine rollers and plows. The threat posed by scatterable mines mandates that mine rollers and plows be organic to the tank battalion for immediate availability and training familiarity. A mine detection and countermine device, such as the Vehicular Magnetic Signature Duplicator(VEMASID), should be developed and fielded for

placement on one combat vehicle per platoon in both tank and mechanized infantry units.

The development of an armored engineer mobility vehicle is crucial to the breaching of natural and complex obstacles as well as the clearing of rubble caused by collateral battlefield damage. The current Operational and Organizational Plan for the proposed Combat Mobility Vehicle(CMV) is an excellent outline of the required systems and capabilities for the CMV. I suggest the priority of anti-mine, anti-tank ditch, and an articulating arm to lift, drag, and grapple be the priority of development of the CMV's mobility sub-systems.

The "linch pin" of in-stride breach operations is reconnaissance. For future tactical operations, the use of remotely piloted aerial platforms to detect enemy and natural obstacles must be integrated into the reconnaissance assets available to the maneuver commander. For a near term solution, integration of engineer-sappers with the maneuver task force scouts is recommended. Training of divisional engineer squads must include recognition of Soviet mines and likely areas of Soviet countermobility operations. Until equipment development and fielding can provide a stand-off detection capability for the maneuver task force, the engineer supporting the task force reconnaissance element must be a highly trained "specialist" with superior training and initiative to recommend bypass routes, estimate effort for breaching operations, and anticipate the enemy countermobility

scheme. Intelligence preparation of the battlefield by the task force commander and his staff must also anticipate effects of enemy counterobstacle operations.

Current doctrine does not recognize the in-stride breach as a tactical mission. Until the current shortfall of mobility and reconnaissance capabilities is resolved, the in-stride breach must be considered a deliberate mission for the maneuver task force. Without extensive prior planning, rehearsals, and detailed instructions to all participants, current maneuver force mobility capabilities fail to rapidly integrate the combined arms assets of engineers, air defense, artillery, mortars, scouts, infantry, and armor. The National Training Center is validating the need for a better combined arms integration in breaching operations as well as highlighting the need for improvements in the areas of detection, reduction, and marking of obstacles. Training and evaluation of doctrinal techniques are limited by the paucity of realistic training aids.

My final appraisal is that the doctrine requiring an in-stride breach is sound and I support completely the following assessment from the TRADOC General Officer Steering Committee for the Countermine Master Plan:[38]

> By the 21st Century, it is more than feasible that natural and man-made obstacles to movement could be located, reported, breached, marked, and crossed in-stride and under fire.

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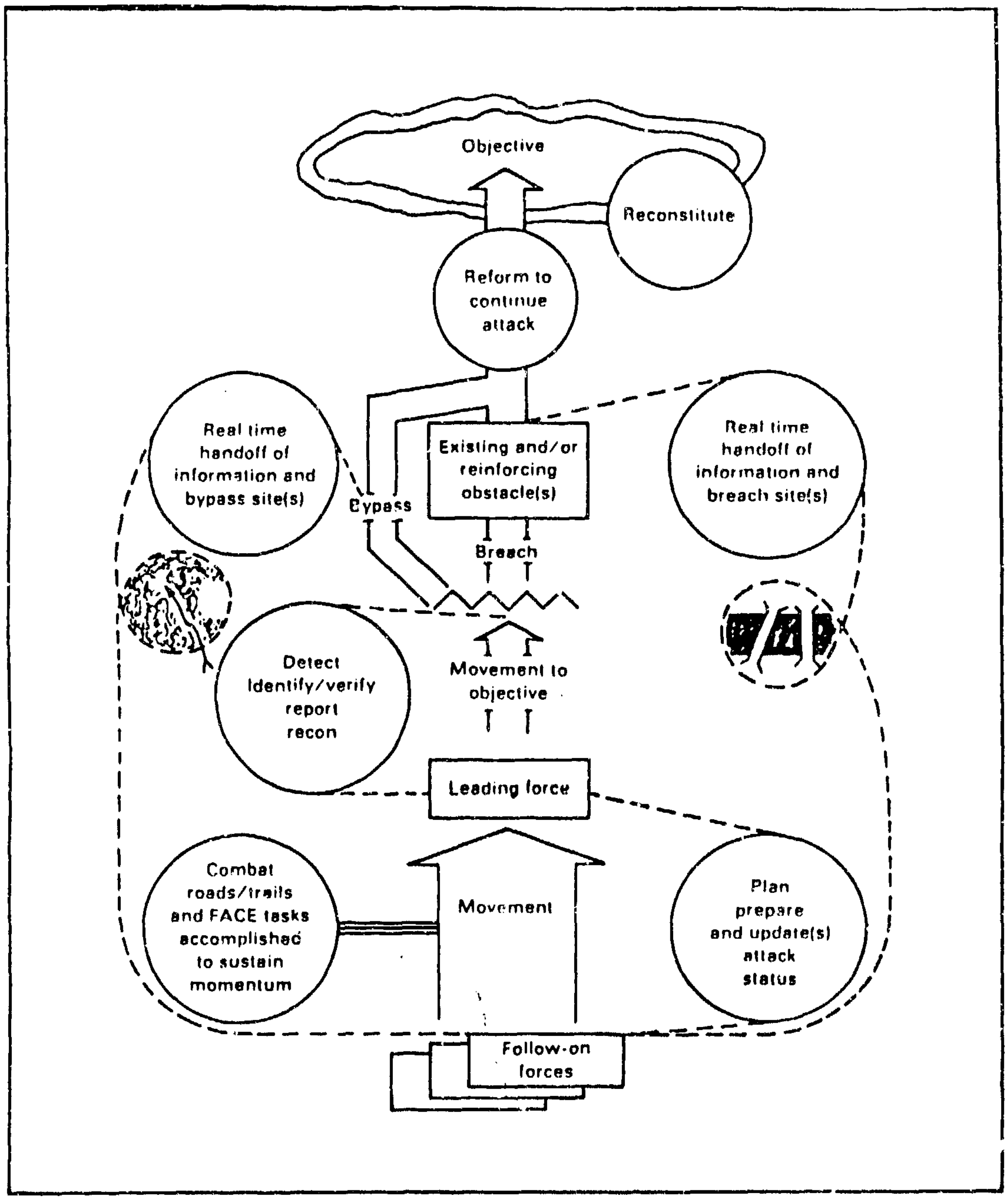
[38]"U.S. Army General Officer Steering Committee Countermine Master Plan," U.S. Army Engineer School (14 September 1988), p. 3-2.

The capability to execute an in-stride breach does not exist in today's U.S. maneuver force. Until that capability is developed, fielded, and sustained by realistic training, the in-stride breach should be recognized as a deliberate mission for maneuver forces.

FIGURE 1: The Mobility Scheme



Reference: Field Manual 5-101, Mobility. Washington, D.C.: U.S. Government Printing Office, 1985, page 2-7.

FIGURE 2: U.S. Task Force In-Stride Breach

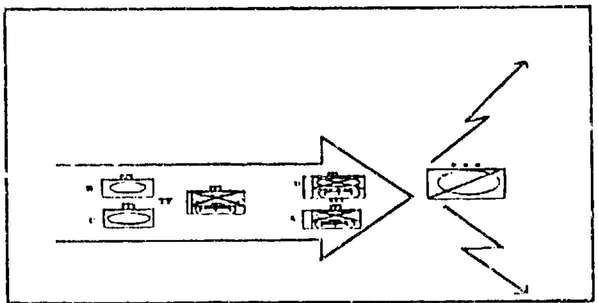


Figure 5-1. The task force moves toward contact

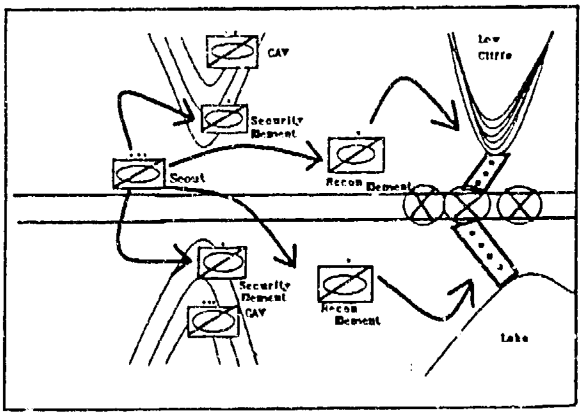


Figure 5-3. Scouts deploy into security and reconnaissance elements and position themselves to overwatch and observe the far side of the obstacle

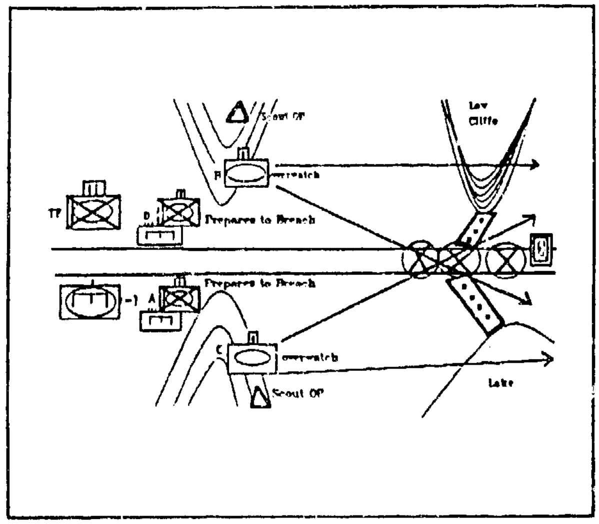


Figure 5-4. Teams B and C move to overwatch supporting the breaches

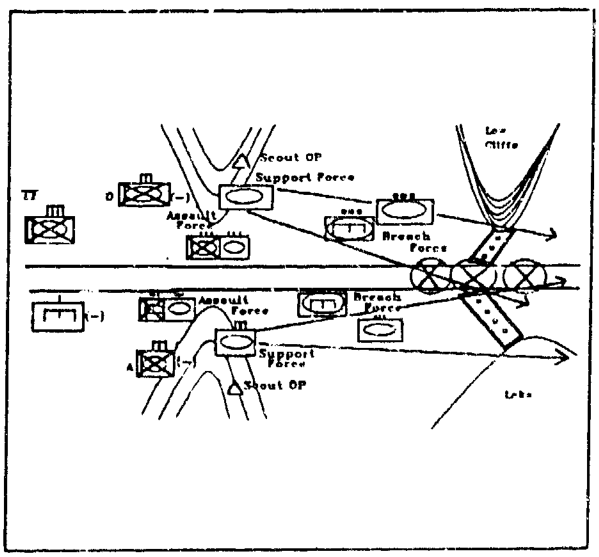


Figure 5-5. Teams A and D attack to breach in-stride

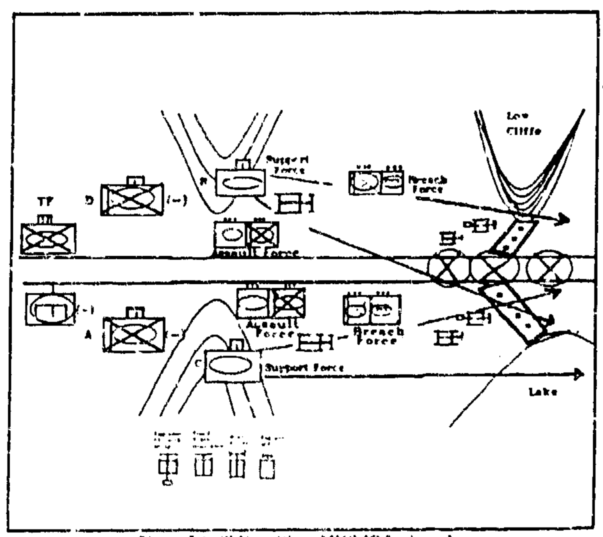


Figure 5-6. CEV positions MICLIC for breach as track-width mine plow leads the assault force

Reference: Field Circulair 90-13-1, <u>Combined Arms Counterobstacle Operations: The In-Stride Breach</u>. Ft. Belvoir: USAES, June 1987, pages 5-3 to 5-9.

FIGURE 3: March Formation for a Soviet Motorized Rifle Regiment

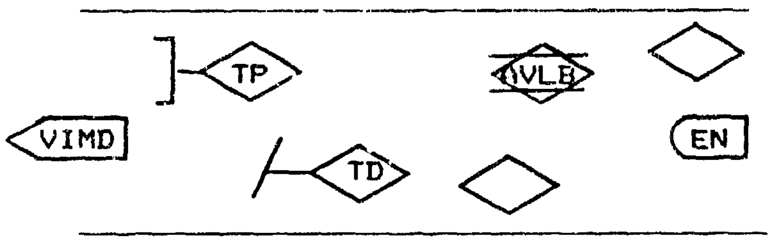
<——————————— 3-8km ———————————>

Units	Element
Motorized Rifle Squad/Motorized Rifle Platoon Leader NBC Reconnaissance Team **Engineer Reconnaissance Patrol** Motorized Rifle Squad(2)	**COMBAT RECON PATROL**
	20-30km
Motorized Rifle Company/Tank Platoon **Movement Support Detachment** Mortar Battery/Artillery Battery Chemical Defense Platoon	**FORWARD SECURITY ELEMENT**
	10-15km
Battalion Headquarters Anti-tank Platoon/Anti-aircraft section Artillery Battalion(-) Tank Company(-) Motorized Rifle Company(2) Rear Services	**ADVANCE GUARD**
	10-15km
Regimental Headquarters Anti-tank Battery/**Mobile Obstacle Detachment** Anti-tank Section/SAM Platoon Artillery Battalion Motorized Rifle Battalion/Tank Company(2) Rear Services	**MAIN FORCE**

Reference: "Soviet Combat Engineers", USAES Combat Engineer Special Text, Ft. Belvoir: Department of Combined Arms, July 1988.

FIGURE 4: Soviet Engineer Reconnaissance Patrol and Movement Support Detachment

Engineer Reconnaissance Patrol



VIMD — Vehicular Induction Mine Det.
EN — Engr. APC
AVLB — Armored Vehicle Launched Bridge
TD — Tank Dozer
TP — Tank w/Mine Plow/Roller

Reference: Combat Support, Engineering, and Mine Warfare, Mission Area Analysis. Ft. Belvoir, Va. May 1983, Volume V, page 2-55.

Movement Support Detachment

1. Reconnaissance and Barricade Removal Destruction Group
   - -1 Tank w/mine plow
   - -1 APC with Combat Engineer Squad
     explosives
     mine detectors
     mine probes
   - -1 Armored Bridge Laying Vehicle(MTU-20)
   - -1 BRDM (NBC reconnaissance version)(NBC Detection Section)

2. Road-Bridge Group
   - -1 APC/Truck with Combat Engineer Squad
   - -2 to 4 Truck launched Scissors Bridge(TMM)
   - -Tracked Bulldozer(BAT-M)/Armored Engineer Tractor(IMR)
   - -Crane/Bucket Excavator
   - -Carriers for Bridge and Road Personnel
   - -Motorized Rifle Platoon(-1 squad)

3. Route Marking Group
   - -Motorized Rifle Squad(could be larger as required)
     route marking equipment

References: 1. Gerner, D. "The Organization, Equipping, and Operational Principles Adhered to by a Soviet Combat Engineer Company". Charlottesville: Army Foreign Science and Technology Center, 1985, page 21.

2. Field Manual 100-2-1, The Soviet Army Operations and Tactics. 16 July 1984, page 14-3.

FIGURE 5: Soviet Mobile Obstacle Detachment

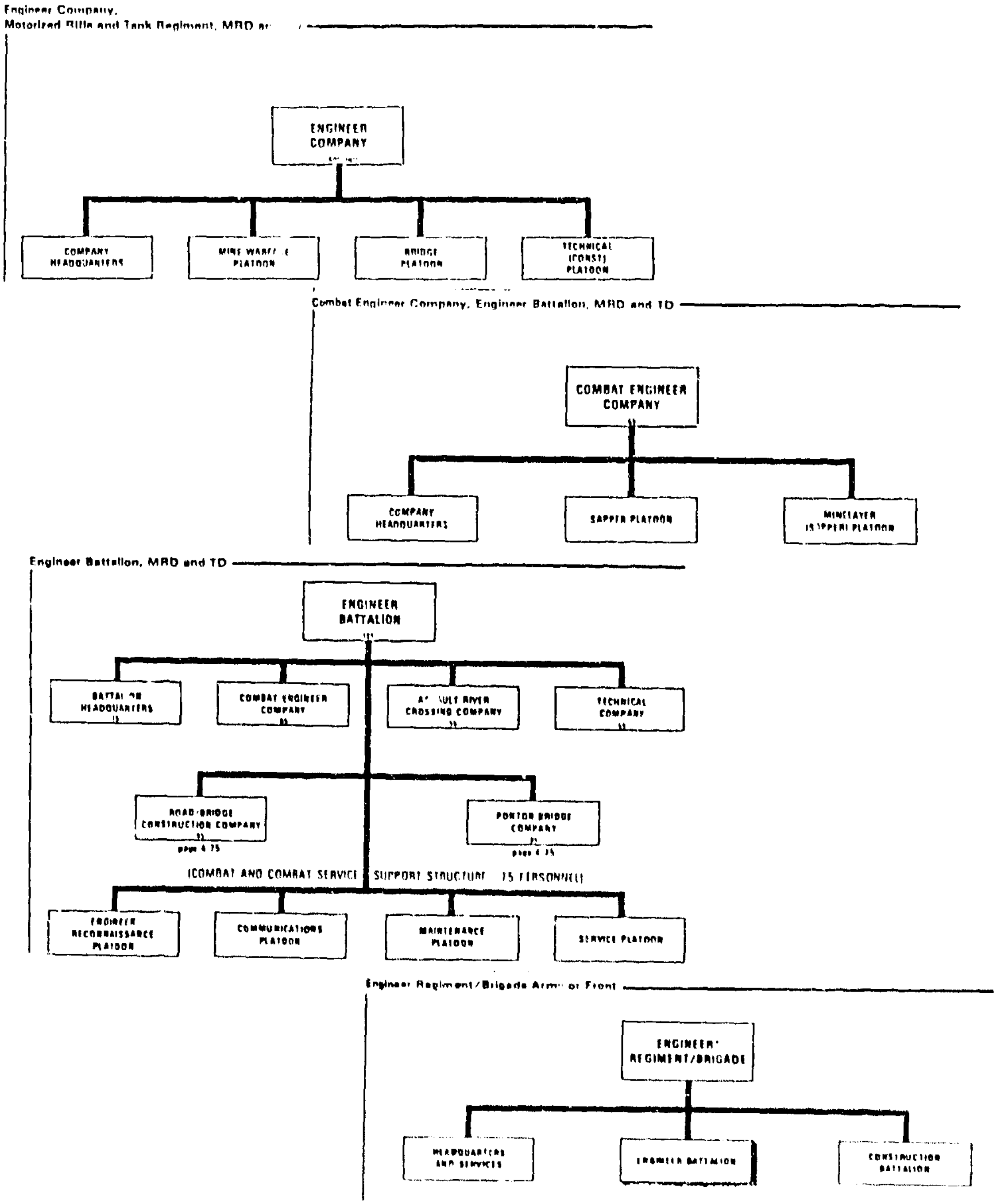
1. Reconnaissance and Route Marking Element
   - Truck/APC with half of a Combat Engineer Squad
   - Route Marking Kit
   - 1 Anti-tank Officer (assigned from AT force element)

2. Barrier Construction Element
   - 3 Trucks with Mine Laying Trailers
   - 1 Truck with a Combat Engineer Squad with Explosives
   - 1 Bulldozer
   - 2 to 3 Trucks with Additional Mines

3. Support Element
   - 1 Anti-tank Platoon(3 AT Weapons)
   - 1 Motorized Rifle Platoon with SAGGER/SPG-9

Reference: Gerner, D. "The Organization, Equipping, and Operational,Principles Adhered to by a Soviet Engineer Company". Charlottesville: Army Foreign Science and Technology Center, 1985, page 22.

FIGURE 6: Soviet Engineer Organizations



Reference: Field Manual 100-2-3, The Soviet Army Troops, Organization, and Equipment. Washington, D.C.: U.S. Government Printing Office, 1984, pages 4-17, 4-70, 4-73, 4-119.

FIGURE 7: U.S. and Soviet Divisional Breaching Capabilities

	U.S.	Soviet
Maneuver Forces		
Number of Personnel	16,951	11,470
Number of Combat Vehicles	754	672
Breaching Doctrine		
Number of Lanes/Breach	2/TF	1-2/Co
Engineer Forces		
Number of Personnel (Div Bn)	890	395
Number of Personnel (Reg Co)	0	(3@70) 210
% of Division Strength	5.25	5.27
Mobility Equipment		
Armored Engineer Tractor	-	2 IMR
Combat Engineer Vehicle	8 CEV	-
Combat Dozer	25 M9	12 BAT
Mine Roller	18 Tank Mtd	30 KMT5
Mine Plow	-	90 KMT4/6
Tank Mtd Dozer Blade	18 M60A3	12 BTU
Mineclearer	-	2 BTR50

Reference: Schroedel, Joseph. "Tactical Mobility: Organizing Engineers for an All Arms Problem". Ft. Leavenworth, Ks.: SAMS Monograph, 1987, pages 55-56.

BIBLIOGRAPHY

BOOKS

Bellamy, Chris. The Future of Land Warfare. New York: St. Martin's Press, 1987.

Beck Alfred M., et.al. The Corps Of Engineers: The War Against Germany. Washington, D.C.: Center of Military History, 1985.

Carver, Field Marshall Lord Marshall. The Apostles of Mobility. London: William Morrow and Company, Inc., 1965.

Coll, Blanco D., et al. United States in World War II, The Technical Services: The Corps of Engineers: Troops and Equipment. Washington, D.C.: Office of the Chief of Military History, 1958.

Dragunskiy, David A., et.al. The Motorized Rifle(Tank) Battalion in Combat. Moscow: Voyenizdat, 1986. (Translation: Foreign Broadcast Information Service, JPRS-UMA-88-004-L-I, 24 March 1988)(FOUO)

English, John A. A Perspective on Infantry. New York: Praeger Publishers, 1981.

Giles, Janice H. Damned Engineers. Boston: Houghton-Mifflin, 1970.

Kolibernov, Y.S., et al. Making of Passages Through the Defenses. Moscow: Voyenizdat, 1984. (Translation: Army Foreign Science and Technology Center, 1985, AD-B095606).

Kolibernov, Y.S. Combat Engineer Support. Moscow: Inzhenernoe Obespecheniye Boya, 1984. (Translation: Foreign Broadcast Information Service, JPRS-UMA-085-020L, 26 August 1985)(FOUO)

Radziyevskiy, A.I. Wartime Operations in 1941-45: The Breakthrough. Moscow: Voyenzidat, 1978. (Translation: Foreign Broadcast Information Service, JPRS L/10418, 26 March 1982).

Reznichenko, V.G., editor. Tactics-A Soviet View. Moscow, 1984. (Translated by the U.S. Air Force Intelligence Service. Washington, D.C.: U.S. Government Printing Office, 1987.)

Slepenkov, V.P., et.al.. Army Operations. Moscow: Ministerstva Oborony SSR, 1977. (Translated by Foreign Technology Division, 1 February 1983.) (AD-B07070776L)

Sloan, C.E. Mine Warfare on Land. London: Brassey's Defence Publishers, 1986.

Simpkin, Richard E. Antitank. London: Brassey's Defence Publishers,1982.

Simpkin, Richard E. Race to the Swift: Thoughts on Twenty-first Century Warfare. London: Brassey's Defence Publishers, 1985.

Simpkin, Richard E. Red Armour. Oxford: Brassey's Defence Publishers, 1984.

Thompson, Paul W. Engineers in Battle. Harrisburg: Military Service Publishers, 1942.

JOURNALS AND PUBLICATIONS

Aganov, S. "Engineer Support". Charlottesville, Va.: Army Foreign Science and Technology Center, 1986.(AD-B110244)

Aganov, S. "Combat Engineers in the Battle for Stalingrad". Voyenno-Istoricheskiy Zhurnal. No. 11, 1982. (Translation: JPRS 82864, 15 Feb 1983).

Aliverov, S. "Wartime Experince: Breakthrough of Enemy Defenses by a Rifle Corps." Voyenno-Istoricheskiy Zhurnal. No. 3, 1983. (Translation: JPRS 83593, 2 Jun 1983).

Baldwin, William C. and Barry W. Fowle. "World War II Engineers in the European Theater". Engineer. Vol. 14., No. 4, Winter, 1984-85.

Duda, Joseph J. "Combat Engineers in the Defense of Mother Russia". Engineer. Vol. 17, No. 1, 1987.

Donnelly, C.N. "Combat Engineers of the Soviet Army". International Defense Review. February, 1978.

Fastabend, David and Ralph Graves. "Maneuver, Synchronization, and Obstacle Operations". Military Review. Vol. 66, No. 2, February, 1986.

Fuhrman, Russell L. "Countermine for the AirLand Battle". Engineer. Vol. 13, No. 1, Spring, 1983.

Galitsky, I. "Wartime Operations: Combat Engineers in the Defence of Moscow". Voyenno-Istoricheskiy Zhurnal. No. 10, 1981. (JPRS 80024, 4 Feb 1982).

Gladkov, V. "Engineer Support to Combined Arms Combat". Voyennyy Vestnik. No. 6, 1984. (AD-B089742)

Hoge, Phillip R. and Pat R. Stevens. "The State of the Combat Engineer". Engineer. Vol. 17, No. 1, 1987.

Ivanov, A., et.al. "A Special Tactical Exercise with a Combat Engineer Battalion". Voyennyy Vestnik. No. 11, 1979.

Kayner, N., et.al. "Obstacle Clearing Party in Offensive Combat". Voyennyy Vestnik. No. 4, 1983.

Kolibernov, Ye., et al. "Wartime Experiences: Engineer Support of Ground Attacks". Voyenno-Istoricheskiy Zhurnal. No. 8, 1980.

Leoshenya, Ye., et al. "Wartime Order and Tasks of Engineer Service". Voyenno-Istoricheskiy Zhurnal. No. 12, 1978.

Limno, A. "How to Operate a Mobile Obstacle Detachment". Voyennyy Vestnik. No. 10, 1986. (JPRS-UMA-87-022, 9 April 1987).

Murphy, Stanley J. and F. Marion Cain. "The Evolution of Engineer Tactical Doctrine and Equipment, 1939-1944". Engineer. Vol. 15, No. 4, Winter, 1985-86.

Parfilov, Yu. "Engineer Support to a Breakthrough of Defenses". Voyennyy Vestnik. No. 9, 1976.

Parker, Frederick E. "Soviet Countermobility Operations". Engineer. Vol. 17, No. 1, 1987.

Plyaskin, V. Ya, et al. "Engineer Support of Combined Arms Combat". Itzhenernoye Obespechenoye Obshehevoyskove Boya. (Translated by National Technology Information Service, Sept. 1973). (AD-786832)

Real, F. Michael and Penelope Schmitt. "AirLand Battle Doctrine-The Red Army Responds". Engineer. Vol. 17, No. 1, 1987.

Rybicki, John F. "Emerging Mine Warfare Capabilities". The Military Engineer. No. 518, Nov-Dec, 1987.

Sidorov, V. "Tactical Obstacles". Voyennyy Vestnik. No. 6, 1976.

Sidorov, V. "Wartime Use of Engineer Obstacles Described". Voyenno-Istoricheskii Zhurnal. No. ', 1979.

Sokolov, A.A. "Achieving High Rates of Advance in Front Operations of the Great Patriotic War". Voyenno-Istoricheskii Zhurnal. No. 12, 1985.

Soskov, A. "Wartime Operations: Methods of Breaching Minefields". Voyenno-Istoricheskii Zhurnal. No. 4, 1980.

Soskov, A. "Wartime Operations: Control of Engineer Troops". Voyenno-Istoricheskii Zhurnal. No. 3, 1981. (JPRS 79545, 30 Nov 1981).

Starodymov, N. "Keeping the Column Moving". Voyennyy Vestnik. No. 10, 1986. (JPRS-UMA-87-022, 9 April 1987).

Turbiville, Graham H. "Ambush! The Road War in Afghanistan". Army Magazine. January 1988.

Turbiville, Graham H. "Soviet Combat Engineers in Afghanistan". The Military Engineer. Vol. 80, No. 524, 1987.

Ushakov, D. "The Role of Engineer Troops in Modern War". Voyenno-Isherenerny Zhurnal. No. 5-6, 1946. (Translation: Dept. of the Army, ACSINTEL, No. F-1622-a).

Ustinov, G. "Mine Clearing Operations to Break the Encirclement of Barikot". Isvestiya. 27 July 1985. (JPRS-UMA-85-059, 4 November 1985).

Volodin, N. "Assignment of Combat Engineers in Breakthrough and Development of the Offensive". Voyenno-Ishernerny Zhurnal. No. 5-6, 1946. (Translation: Dept. of the Army, ACSINTEL).

Whitley, James R. "Engineer Combat Multipliers for the Maneuver Forces". Military Review. Vol. 62, No. 9, 1982.

Zlatkovsky, M. "The Mobile Obstacle Detachment". Voyennyy Vestnik. No. 9, 1979. (AD-B050262)

Zhukov, V., et.al. "In the Interests of a Forward Detachment". Voyennyy Vestnik. No. 12, 1980.

______. "The Impact of the Dieppe on the Development of Mobility Equipment". Engineer. Vol. 15, No. 4, Winter, 1985-86.

MANUSCRIPTS

Cerjan, Paul G., et al. "Employment of the Engineer System in Arid, Mountainous, and Desert Areas". Carlisle Barracks, Pa.: U.S. Army War College, 1981. (AD-A103833)

Charles, Frederick J. "Combat Engineer Equipment: Achilles Heel in the Offense". Carlisle Barracks, Pa.: U.S. Army War College, 1986. (AD-A170235)

Coroalles, Anthony M. "Fighting in the Medium of Time".

Ft. Leavenworth, Ks.: School of Advanced Military Studies Monograph, 1988.

Cottrell, Scott B. "Command and Control Relationships and Organization of Engineer Support". Ft. Leavenworth, Ks.: School of Advanced Military Studies Monograph, 1985. (AD-A167708-3)

Dauber, P.F. "Concept and Operating Principles of the German Armored Combat Troops". U.S. Army TRADOC Liaison Office, German Army Office, 1982. (AD-B078090)

Day, Overton. "The Mobile Obstacle Detachment of the Soviet Ground Forces". New York: Army Russian Institute, 1980. (AD-A102465)

Gill, Clair F., et al. "USAWC Military Studies Program: Engineer Directions: AirLand Battle 2000". Carlisle Barracks, Pa.: U.S. Army War College, 1983. (AD-A131644)

Gerner, D. "The Organization, Equipping, and Operational Principles Adhered to by a Soviet Combat Engineer Company". Charlottesville: Army Foreign Science and Technology Center, 1985. (AD-B091251)

Ivanov, Ivan. "The Engineer Platoon as a Mobile Obstacle Unit During an Offensive". Charlottesville: Army Foreign Science and Technology Center, 1981. (AD-B058274L)

Kanda, Richard. "Combat Engineer", Mounted Warfare Study 2004, Annex E. Carlisle, Pa.: U.S. Army War College, 1987.

Kolibernov, E.S. et al. "Construction of Engineer Obstacles and Demolition Work". Charlottesville, Va.: Army Foreign Science and Technology Center, 1985. (AD-B094662)

Luttwak, Edward N. "Historical Analysis and Projection for Army 2000, Vol. 1, Part 6. The Soviet Army of the Second World War". Chevy Chase: Edward Luttwak, Inc., 1983. (AD-B085087)

Morris, John W. "Combat Engineers, Mobility, History, AirLand Battle". Carlisle Barracks, Pa.: U.S. Army War College, 1987. (AD-A180416)

Schroedel, Joseph. "Tactical Mobility: Organizing Engineers for an All Arms Problem". Ft. Leavenworth, Ks.: School of Advanced Military Studies Monograph, 1987. (AD-A191396-5)

Wilson, Michael T. "Tactical Survivability: The Engineer Dilemma". Ft. Leavenworth, Ks.: School of Advanced Military Studies Monograph, 1987. (AD-A190848-2)

_____. "Armored Family of Vehicles Operational and Organizational Plan, Combat Mobility Vehicle". (Draft) Appendix 6 to Annex D. Ft. Leavenworth, Ks.: U.S. Army Combined Arms Combat Development Activity, 25 August 1988.

_____. Art of War Colloquium Publication--New Problems in Warfare by M. Tuckhachevskiy. Carlisle Barracks, Pa.: U.S. Army War College, 1983.

_____. "Breaching Operations". U.S. Army Engineer School Special Text. Ft. Belvoir, Va.: Department of Combined Arms, September 1988.

_____. Combat Support, Engineering and Mine Warfare, Mission Area Analysis. Ft. Belvoir, Va: U.S. Army Engineer School. May 1983 (Classified SECRET)

_____. "Countermine/Counterobstacle Field of Endeavor". Ft. Belvoir, Va.: Belvoir Research, Development, and Engineering Center(USA TROSCOM). FY 88 Report. (Unclassified)

_____. "Engineering and Mine Warfare Mission Area Concept"(DRAFT). Ft. Leonard Wood, Mo.: U.S. Army Engineer School Directorate of Combat Developments, 5 October 1988. (Unclassified)

_____. "Engineers in the Assault". U.S. Army Engineer School Special Text. Ft. Belvoir, Va.: Department of Combined Arms, July 1988.

_____. "Historical Scenarios of Soviet Breakthrough Efforts In World War 2". Loring, Va.: Historical Scenarios and Research Organization. (AD-B085087)

_____. "Operational Concept for the Employment of Heavy Forces-- AirLand Battle Future: 2004". Ft. Leavenworth, Ks.: AirLand Battle Future Special Study Group, 30 June 1988.

_____. "Soviet Combat Engineers". U.S. Army Engineer School Special Text. Ft. Belvoir, Va.: Department of Combined Arms, July 1988.

_____. Soviet Engineer Equipment: Third Generation. U.S. Army Scientific and Technical Intelligence Bulletin. May 1984. (Classified SECRET)

_____. "Soviet Tank Company Tactics". Defense Intelligence Report. May, 1976. (DDI-1120-129-76)

_____. "Soviet Tank Regiment Tactics". Defense Intelligence Report. May, 1979. (DDB-1120-12-79)

_____. "The Soviet Motorized Rifle Battalion". Defense Intelligence Report. September, 1978. (DDB-1100-197-78)

_____. "U.S. Army Armor/Anti-Armor Master Plan (A3MP) (Phase II)". Ft. Leavenworth, Ks.: U.S. Combined Arms Center, FY 89. (Classified SECRET)

_____. "U.S. Army General Officer Steering Committee Countermine Master Plan--A Strategy for Countermine Preparedness". Ft. Leonard Wood, Mo.: U.S. Army Engineer School Directorate of Combat Developments, 14 September 1988. (Classified SECRET)

GOVERNMENT PUBLICATIONS

Department of the Army Pamphlet 20-201, Military Improvisations During the Russian Campaign. Washington, D.C: U.S. Government Printing Office, 1951.

Department of the Army Pamphlet 20-230, Russian Combat Methods in World War II. Washington, D.C.: U.S. Government Printing Office, 1951.

Department of the Army Pamphlet 20-233, German Defense Tactics Against Russian Breakthroughs. Washington, D.C.: U. S. Government Printing Office, 1951.

Department of the Army Pamphlet 20-234, Operations of Encircled Forces-German Experience in Russia. Washington, D.C.: U.S. Government Printing Office, 1951.

Department of the Army Pamphlet 20-269, Small Unit Actions During the German Campaign in Russia. Washington, D.C.: U.S. Government Printing Office, 1953.

Field Circular 90-13-1, Combined Arms Counterobstacle Operations: The In-Stride Breach. Ft. Belvoir: U.S. Army Engineer School, June, 1987.

Field Manual 5-6, Operation of Engineer Field Units. Washington, D.C.: U.S. Government Printing Office, April 1943.

Field Manual 5-100, Engineer Combat Operations (Coordinating Draft). Ft. Belvoir, Va.: U.S. Army Engineer School, June, 1988.

Field Manual 5-101, Mobility. Washington, D.C.: U.S. Government Printing Office, 1985.

Field Manual 20-32, Mine/Countermine Operations. Washington, D.C.: U.S. Government Printing Office, December 1985.

Field Manual 71-2, The Tank an Mechanized Infantry Battalion Task Force (Final Draft). Washington, D.C.: U.S. Government Printing Office, January 1988.

Field Manual 100-2-1, 100-2-2, 100-2-3, The Soviet Army. Washington, D.C.: U.S. Government Printing Office, 1984.

Field Manual 100-5, Operations. Washington, D.C.: U.S. Government Printing Office, 1941, 1944, 1986.

Rheinhardt, Hellmuth. Selected German Army Operations on the Eastern Front. Washington, D.C.: U.S. Government Printing Office, 1983.

NTC Lessons Learned. Ft. Leavenworth, Ks.: Combined Arms Training Activity. 1986-1988.

Technical Manual 30-430, Handbook on U.S.S.R. Military Forces. Washington, D.C.: U.S. Government Printing Office, November, 1945.

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